

its throat, for the whole length of its neck, which were thought to be Soldier Crabs. These crabs occur in large numbers on the mudflats at Red Rock.

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BIRDS KILLED ON SOME SECONDARY ROADS IN WESTERN AUSTRALIA

R. J. BROWN, M. N. BROWN and B. PESOTTO*

RMB 253, Manjimup, Western Australia 6258
*P.O. Box 102, Manjimup, Western Australia 6258

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Between January 1984 and December 1985 the corpses of 127 birds of 32 species were collected during routine journeys along secondary roads in an area of approximately 40 km² near Manjimup in the south west of Western Australia. Peak months were November to March and 57% of the casualties were juveniles. Ten banded birds were recovered during the study.

INTRODUCTION

Since 1977 birds were banded by (RB and MB) in four areas of remnant forest and on 10 irrigation dams, all within 5 km of where we live. Prior to December 1983, we attempted to recover banded birds by examination of corpses found on the secondary roads in this area. This paper originated when one of us (BP) suggested that all road kills should be collected and examined. It represents data gathered over 2 years, from January 1984 to December 1985. Previous analyses of road kills in Australia have been made by Vestjens (1973) and Disney and Fullagar (1978).

METHODS

Although roads were travelled every month of the year, the timing of the journeys was irregular, and no special searches were made. Dead birds were collected, as we drove between properties (BP), or to the study areas (RB & MB). Inter-property journeys were by tractor or "Land Rover" giving slower speeds and good vision. The majority of the casualties were collected this way by (BP). The road pattern within the study area is shown in Figure 1. The South-west and Muir Highways formed the western and north-eastern boundaries of the study area, and these were not examined for road casualties.

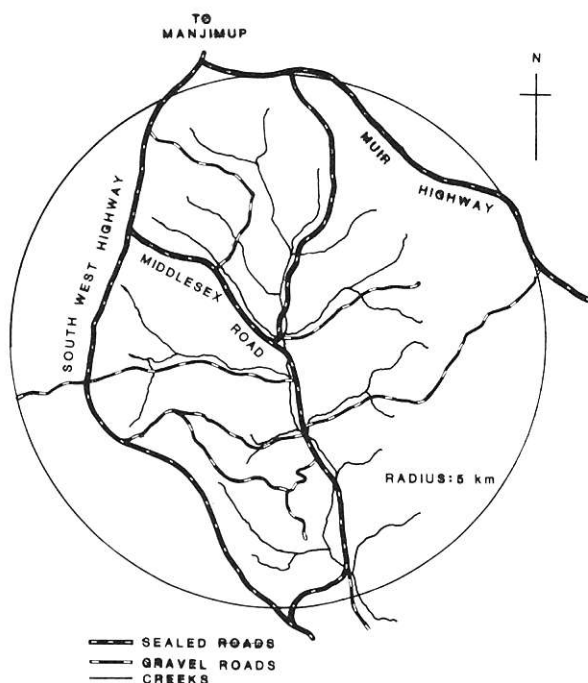


Figure 1. Study area depicting relationships of roads to creeks.

Two of the roads within the study area are sealed, whilst the rest are gravel with less frequent traffic. The sides of the roads are well vegetated with brush, shrubs, and frequent large trees, predominantly Karri, *Eucalyptus diversicolor*, and Marri, *E. calophylla*. The majority of the roads follow the permanent and winter flowing creeks. The study area is agricultural land used for orchards, grazing, and vegetable growing. An occasional Rabbit *Oryctolagus cuniculus*, Fox, *Vulpes vulpes*, or Domestic cat *Felis catus* were the only mammalian carrion seen on these roads.

RESULTS

A total of 127 birds of 32 species were found dead along the roads surveyed (Table 1). The majority of dead birds were found during the breeding months of November to March (Figure 2), with the greatest number being juveniles. Western Rosella, *Platycercus icterotis*, and Silvereye *Zosterops lateralis*, were the commonest casualties. Of the 28 687 birds banded in this area only 10 were recovered as road kills during the period of the study (Table 2).

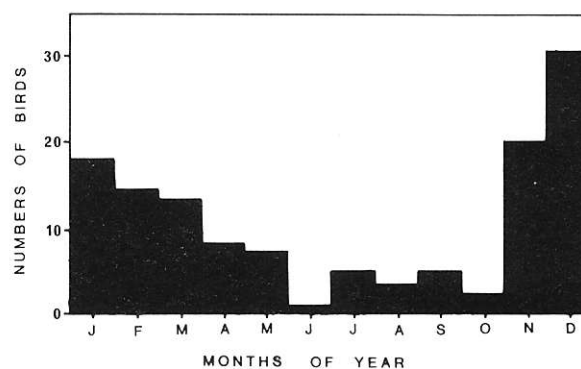


Figure 2. Cumulative distribution and numbers of birds, found dead along surveyed roads, during 1984 and 1985.

DISCUSSION

The greatest number of birds killed were juveniles as also found by Vestjens (1973) and Disney and Fullagar (1978). Only seven species collected by us were non passerine, 27 percent compared with the 44 percent found by Vestjens (1973); this was probably due to geographical differences in the areas censused. No grain is grown in our study area and so there is no spillage from carting to attract granivorous birds, hence we collected fewer parrots than Vestjens (1973). There was insufficient carrion to attract scavengers or raptors. The only observed use of roads as a food source was by insectivores taking termites which had fallen after nuptial flights. As most flights were in the late afternoon, they coincided with the commuter traffic. Australian Magpie-larks, *Grallina cyanoleuca*, were seen running to pick up termites from the road surface, and it is thought that this behaviour contributed to the high mortality for this species. Western Rosellas and Common Bronzewing, *Phaps chalcoptera*, were habitual road users, presumably searching for grit. The former species was frequently hit by traffic, but bronzewings were less frequent fatalities because of the rapidity of their take-off and subsequent flight parallel to the road, rather than across the line of traffic as the rosellas tended to do.

The majority of the roads follow creeks which are well vegetated with trees and shrubs, and are a preferred travelling route for small birds. Not surprisingly a large proportion of casualties occur

TABLE 1

Numbers and species of birds killed each month 1 January 1984 to 31 December 1985.

SPECIES	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
NON-PASSERINE													
Western Rosella	1								2	1			4
<i>Platycercus icterotis</i>		(2)	(3)	(1)						(3)			(9)
Purple Swamphen							1			1			2
<i>Porphyrio porphyrio</i>													
Common Bronzewing											1		1
<i>Phaps chalcoptera</i>										(1)			(1)
Shining Bronze-cuckoo										1			1
<i>Chrysococcyx lucidus</i>										(1)			(1)
Laughing Kookaburra									1				1
<i>Dacelo novaeguineae</i>				(1)									(1)
Maned Duck			1										1
<i>Chenonetta jubata</i>													
Elegant Parrot													
<i>Neophema elegans</i>										(1)		(1)	1
PASSERINE													
Silvereye	2			1	2		2				1	5	13
<i>Zosterops lateralis</i>		(1)	(1)										(2)
Willie Wagtail													
<i>Rhipidura leucophrys</i>	(1)	(1)									(2)	(7)	(11)
Australian Magpie-lark		1								1			2
<i>Grallina cyanoleuca</i>	(2)		(1)								(3)	(2)	(8)
Tree Martin	2	1									3		6
<i>Cecropis nigricans</i>	(1)	(1)	(1)										(3)
Splendid Fairy-wren	2												2
<i>Malurus splendens</i>	(2)		(1)								(1)	(1)	(5)
Australian Magpie													
<i>Gymnorhina tibicen</i>		(1)	(1)								(1)	(3)	(6)
Scarlet Robin								1					1
<i>Petroica multicolor</i>			(1)	(2)	(1)								(4)
Welcome Swallow		1		1	1		1						4
<i>Hirundo neoxena</i>													
Golden Whistler								1					1
<i>Pachycephala pectoralis</i>			(1)		(2)								(3)
Red-winged Fairy-wren	1											1	2
<i>Malurus elegans</i>		(1)	(1)										(2)
White-naped Honeyeater									1		1		2
<i>Melithreptus lunatus</i>										(2)			(2)
New Holland Honeyeater	1					1		1					3
<i>Phylidonyris novaehollandiae</i>									(1)				(1)
Dusky Woodswallow												1	1
<i>Artamus cyanopterus</i>	(1)	(2)											(3)
Grey Fantail													
<i>Rhipidura fuliginosa</i>	(2)	(1)											(3)
White-winged Triller											1	1	2
<i>Lalage sueurii</i>													
Rufous Songlark											1		1
<i>Cinclorhamphus mathewsi</i>												(1)	(1)
Yellow-rumped Thornbill													
<i>Acanthiza chrysorrhoa</i>				(1)							(1)		(2)
White-breasted Robin								1					1
<i>Eopsaltria georgiana</i>													
Rufous Whistler											1		1
<i>Pachycephala rufiventris</i>													
White-browed Scrubwren													
<i>Sericornis frontalis</i>												(1)	(1)
Clamorous Reed-Warbler													
<i>Acrocephalus stentoreus</i>			(1)										(1)

Juveniles in brackets.

Monthly totals for the two years are combined and species listed in the order of abundance.

TABLE 1 continued.

SPECIES	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Red Wattlebird													
<i>Anthochaera carunculata</i>											(1)		(1) 1
White-fronted Chat			1										1
<i>Ephthianura albigrons</i>					1								1
Red-eared Firetail													1
<i>Emblema oculata</i>													1
Australian Raven				1									1
<i>Coryvus coronoides</i>													1
	9	3	2	3	4	1	5	3	4	2	9	10	55
	(9)	(11)	(11)	(5)	(3)				(1)		(11)	(21)	(72) 127

Juveniles in brackets.

Monthly totals for the two years are combined and species listed in the order of abundance.

TABLE 2

Banded birds killed on the roads surveyed.

	Species	Age	Sex	Date Banded	Date Recovered Dead	Time Elapsed (months)
014-19240	Scarlet Robin <i>Petroica multicolor</i>	J	F	17 Apr. 84	19 May 84	1
023-14974	Willie Wagtail <i>Rhipidura leucophrys</i>	P	—	23 Nov. 85	26 Dec. 85	1
031-99530	Golden Whistler <i>Pachycephala pectoralis</i>	J	—	13 Feb. 84	23 Aug. 84	6
013-57553	Yellow-rumped Thornbill <i>Acanthiza chrysorrhoa</i>	P	—	10 Dec. 83	4 Apr. 85	16
013-57570	Yellow-rumped Thornbill <i>Acanthiza chrysorrhoa</i>	P	—	13 Oct. 84	15 Nov. 84	1
013-15185	Splendid Fairy-wren <i>Malurus splendens</i>	A	M	20 Dec. 84	28 Jan. 85	1
014-07091	Silvereye <i>Zosterops lateralis</i>	A	—	13 May 82	16 Nov. 84	30
023-24334	White-naped Honeyeater <i>Melithreptus lunatus</i>	J	M	31 Mar. 84	7 Nov. 85	19
031-96563	New Holland Honeyeater <i>Phylidonyris novaehollandiae</i>	A	M	25 Apr. 81	29 Dec. 83	32
032-07611	New Holland Honeyeater <i>Phylidonyris novaehollandiae</i>	A	M	18 May 84	28 Jun. 84	1

P = Pullus

J = Juvenile

A = Adult

where a road crosses a creek. Flocks of Silvereyes and honeyeaters, or groups of Red-winged Fairy-wrens, *Malurus elegans*, or Splendid Fairy-wrens, *Malurus splendens*, are vulnerable. The two *Malurus* species fly in a straight line at a relatively slow speed, approximately 1 metre above the road. This hazardous procedure may have led to more fatalities than were found, as a result of their smaller corpses being trapped in vehicle grilles and conveyed elsewhere. In studies

of road casualties in England it was found that birds tending to fly low were a significant proportion of those killed by traffic (Dunthorn & Errington 1964).

The choice of roadside trees for nest sites by Australian Magpies, *Gymnorhina tibicen*, results in heavy losses of juveniles killed by traffic (Carrick 1963, Vestjens 1973). A group of magpies nesting in roadside pines on our block (RB & MB) between 1974 and 1984 have fledged 35

young; our records show that only two were raised to independence, and 12 were known to be killed on the road. Magpie-larks also nested in roadside trees, with similar losses of juveniles. Nest site choice was also a probable factor in the recorded deaths of the 11 juvenile Willie Wagtails, *Rhipidura leucophrys*. The preference was not for roadside trees but for sites near water, and since most roads followed a watercourse, juvenile Willie Wagtails were frequently seen using the nearby road surface as a place to await and waylay parents bringing food. Casualties among Tree Martins, *Cecropis nigricans*, could also have been due to the proximity of roads and watercourses, particularly near dams. Flocks of martins were seen in summer and autumn hawking insects over the marshy ground between the road and the water. In the breeding months the birds were seen collecting nest material on gravel roads, an unencumbered surface useful to a species with short weak legs and long tapering wings.

The most frequently observed habitual road crossers were Purple Swamphens, *Porphyrio porphyrio*; they walked swiftly, and appeared to be able to judge the speed of vehicles, rarely being compelled to fly by misjudgement.

It was unexpected to find five dead Scarlet Robins, *Petroica multicolor*, as from banding data and observation they appear to be uncommon in this area. Although we have not seen this species near roads, their perch and pounce feeding method, if used on roads, could be a cause of fatalities. A total of 15 Silvereyes was unexpectedly low, as they are a common species throughout the year with seasonal increases of large nomadic flocks. For example, during the

past 9 years we have banded 14 591 Silvereyes as compared to only 158 Scarlet Robins.

In conclusion, the most vulnerable species in our area were the Australian Magpie and the Australian Magpie-lark which nest in roadside trees, and Western Rosellas collecting grit from roads. The proximity of roads to watercourses may have been a cause of casualties, either among birds following creek vegetation and crossing roads, or through a preference for nest sites near water leading to the loss of juveniles on the road. We found no evidence to suggest that any species was seriously endangered by traffic; the vehicle being just another predator, and the majority of its victims are the same, the young and inexperienced.

Only 10 banded birds were collected from roads during the period of this study (Table 2), probably too small a sample from which to draw conclusions. All were killed within 1 km of the place of banding.

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